

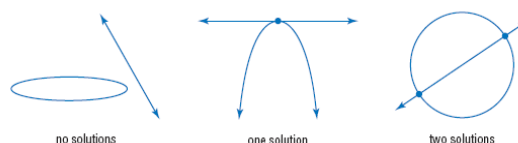
## 8-7 Solving Quadratic Systems

Line and quadratic (0-2 solutions)

Quadratic and quadratic

0-4 solutions

**SYSTEMS OF QUADRATIC EQUATIONS** If the graphs of a system of equations are a conic section and a line, the system may have zero, one, or two solutions. Some of the possible situations are shown below.



If the graphs of a system of equations are two conic sections, the system may have zero, one, two, three, or four solutions. Some of the possible situations are shown below.



Solve.

$$4x^2 + y^2 = 25 \quad \text{ellipse}$$

$$2x + y = -1 \quad \text{line}$$

$$y = -2x - 1$$

$$4x^2 + (-2x - 1)^2 = 25$$

$$4x^2 + 4x^2 + 4x + 1 = 25$$

$$8x^2 + 4x - 24 = 0 \quad \div 4$$

$$2x^2 + x - 6 = 0$$

$$2x^2 + 4x - 3x - 6$$

$$2x(x+2) - 3(x+2)$$

$$(2x-3)(x+2) = 0$$

$$x = \frac{3}{2} \quad x = -2$$

Plug back into the line (when possible)

$$x = \frac{3}{2} \quad x = -2$$

Solve.

$$x^2 - 3y^2 = 8 \quad \text{hyp.}$$

$$x - y = 2 \quad \text{line}$$

$$x = y + 2$$

$$(y+2)^2 - 3y^2 = 8$$

$$y^2 + 4y + 4 - 3y^2 = 8$$

$$0 = 2y^2 - 4y + 4$$

$$0 = y^2 - 2y + 2$$

$$y = \frac{2 \pm \sqrt{4 - 4(1)(2)}}{2}$$

No R sol'n

Solve.

$$x^2 + 2y^2 = 23 \quad \text{ellipse}$$

$$2(2x^2 - y^2 = 1) \quad \text{hyp.}$$

$$4x^2 - 2y^2 = 2$$

$$\frac{x^2 + 2y^2 = 23}{5x^2 = 25}$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$

$$(\sqrt{5})^2 + 2y^2 = 23$$

$$2y^2 = 18$$

$$y^2 = 9$$

$$y = \pm 3$$

$$\{(\sqrt{5}, 3), (\sqrt{5}, -3), (-\sqrt{5}, 3), (-\sqrt{5}, -3)\}$$

$$\{(\pm\sqrt{5}, \pm 3)\}$$

Solve.

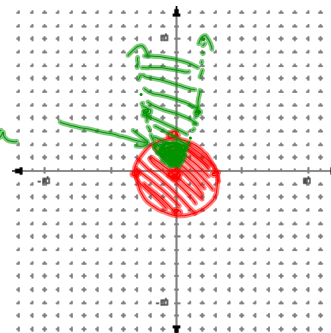
$$\begin{aligned} 3(x^2 + y^2) &= 25 && \text{circle} \\ 2x^2 - 3y^2 &= 30 && \text{hyp.} \\ \hline 3x^2 + 3y^2 &= 75 \\ 5x^2 &= 105 \\ x^2 &= 21 \\ x &= \pm\sqrt{21} \\ y &= \pm 2 && \{\pm\sqrt{21}, \pm 2\} \end{aligned}$$

Solving systems of Inequalities.

$$\begin{aligned} x^2 + y^2 &\leq 9 \\ y &> x^2 + 1 \end{aligned}$$

Circle  
C(0,0)  
r=3

Parabola  
V(0,1)  
 $\frac{2}{2} \frac{5}{5}$

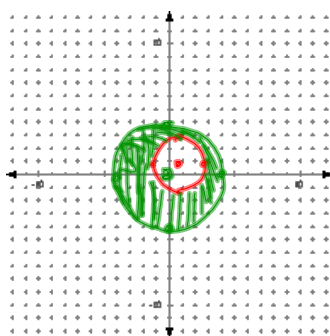


Solve.

$$\begin{aligned} x^2 + y^2 &\leq 16 \\ (x-1)^2 + (y-1)^2 &\geq 4 \end{aligned}$$

C1  
C(0,0)  
r=4

C2  
C(1,1)  
r=2



HW

p458-459

17, 19, 21, 24, 28, 32-34

↑  
line up similar terms